REMARKS

This communication responds to the Office Action dated September 21, 2009. No claims are amended, no claims are canceled, and no claims are added. As a result, claims 1-15 are now pending in this Application.

§ 103 Rejection of the Claims

Claims 1-15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Haitsma et al. (U.S. Pat. No. 7,549,052; hereinafter "Haitsma") in view of Pareira et al. (*Template Based Recovery of Fourier Based Watermarks Using Log Polar and Log-Log Maps*; hereinafter "Pareira"). However, since a *prima facie* case of obviousness has not been properly established by the Office, the Applicant respectfully traverses this rejection of claims 1-15.

1)   **The Applicable Law**

The Examiner has the burden under 35 U.S.C. § 103 to establish a *prima facie* case of obviousness. *In re Fine* , 837 F.2d 1071, 1074, 5 U.S.P.Q.2d (BNA) 1596, 1598 (Fed. Cir. 1988). As discussed in KSR International Co. v. Teleflex Inc. et al. (U.S. 2007), the determination of obviousness under 35 U.S.C. § 103 is a legal conclusion based on factual evidence. *See Princeton Biochemicals, Inc. v. Beckman Coulter, Inc.*, 7, 1336-37 (Fed. Cir. 2005). The legal conclusion, that a claim is obvious within § 103(a), depends on at least four underlying factual issues set forth in *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17 (1966): (1) the scope and content of the prior art; (2) differences between the prior art and the claims at issue; (3) the level of ordinary skill in the pertinent art; and (4) evaluation of any relevant secondary considerations.

The *KSR* Court further held that "rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." (*See In re Kahn*, 441 F. 3d 977, 988 (CA Fed. 2006) cited with approval in *KSR Int'l v. Teleflex Inc.*, 127 S. Ct. 1727, 1740-41 (2007)).

Therefore, the Examiner must, as one of the inquiries pertinent to any obviousness inquiry under 35 U.S.C. §103, recognize and consider not only the similarities but also the critical differences between the claimed invention and the prior art. (*In re Bond, 910* F.2d 831,834, 15 USPQ2d 1566, 1568 (Fed. Cir. 1990), *reh'g denied,* 1990 U.S. App. LEXIS 19971 (Fed. Cir.1990)). Critical differences in the prior art must be recognized (when attempting to combine references). (*In re Bond,* 910 F.2d 831,834, 15 USPQ2d 1566, 1568 (Fed. Cir. 1990), *reh'g denied,* 1990 U.S. App. LEXIS 19971 (Fed. Cir.1990).)

Moreover, the fact that a reference teaches away from a claimed invention is highly probative that the reference would not have rendered the claimed invention obvious to one of ordinary skill in the art. (*Stranco Inc. v. Atlantes Chemical Systems, Inc.,* 15 USPQ2d 1704, 1713 (Tex. 1990).) When the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious. (*Id.* at 4 citing *United States v. Adams,* 383 U.S. 39, 51-51 (1966).)

"If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious." (*In re Ratti,* 270 F.2d 810, 123 USPQ 349 (CCPA 1959). The CCPA has also noted that "[t]he court must be ever alert not to read obviousness into an invention on the basis of the applicant's own statements; that is, we must view the prior art without reading into that art appellant's teachings." *In re Sponnoble,* 160 USPQ 237, 243 (CCPA 1969). These principles have not been changed by the ruling in *KSR.*

2)   *Application of § 103 to the Rejected Claims*

The Office asserts that Haitsma teaches "a method of extracting a fingerprint from an audio signal, the method comprising ... extracting a robust set of perceptual features from the audio signal (... A robust property of each band (e.g. energy) is computed (16) ...); [and] subjecting the extracted set of features to a Fourier-Mellin transform to compensate for speed changes in an audio signal ...". The Office goes on to admit that "Haitsma does not explicitly teach converting the transformed set of features into a sequence constituting a fingerprint."

The Office proposes to remedy this deficiency with Pareira, which is alleged to teach "converting the magnitudes of the Fourier-Mellin transform ... [which] renders the method

robust against rotation scaling or aspect ratio changes. It would have been obvious ... to include
the magnitude algorithm in Fourier transform of Haitsma et al. in order to overcome the
sampling problem and maximizing the number of points matched between the known template
and the image." The Applicant respectfully traverses.

A *prima facie* case of obviousness has not been properly established in this case for at
least three reasons: (1) Pereira is non-analogous art, (2) those of ordinary skill would not be
motivated to combine Haitsma and Pereira, and (3) Pereira does not teach how to apply FFT
magnitude processing to Fourier-Mellin transform components. Each of these points will now be
explained in detail.

1. Pereira is Non-Analogous Art.

The watermarks created by Pereira are substantially different from the fingerprints that
are extracted as part of the claimed subject matter. As a matter of introduction, Pereira
describes:

> "... an approach for embedding a digital **watermark** into an image using the fast
> Fourier transform. To this watermark is added a template in the Fourier transform
> domain to render the method robust against rotations and scaling, or aspect ratio
> changes." Pereira, Abstract.

In stark contrast, the claims of the present Application are directed to methods and
apparatus used to extract **fingerprints** from an audio signal. The Application notes that:

> "Fingerprints, in the literature sometimes referred to as hashes or signatures, are
> binary sequences extracted from multimedia contents, which can be used to
> identify said contents. Unlike cryptographic hashes of data files (which change as
> soon as a single bit of the data file changes), fingerprints of multimedia contents
> ... are to a certain extent invariant to processing ... This is generally achieved by
> extracting the fingerprint from perceptually essential features of the contents."
> Application, pg. 1, lines 6-12.

In other words, the digital watermarking taught by Pereira, and the fingerprints recited in the
claims of the Application, are two different things. Those of ordinary skill in the art realize that
embedding identification information into an image, or detection of image rotation and scaling,

have nothing to do with substantive audio signal recognition. As a further distinction, those of

ordinary skill in the art also know that watermarking is meant to be imperceptible or nearly

imperceptible to the user, whereas fingerprints are extracted from "perceptually essential features

of the contents".

"To Rely on a Reference Under 35 U.S.C. 103, it Must be Analogous Prior Art".

M.P.E.P. §2141.01(a). "A reference is reasonably pertinent if, even though it may be in a

different field from that of the inventor's endeavor, it is one which, because of the matter with

which it deals, logically would have commended itself to an inventor's attention in considering

his problem." *In re Clay*, 966 F.2d 656, 659 (Fed. Cir. 1992)." *KSR Int'l Co. v. Teleflex, Inc.*, 127

S. Ct. 1727, 1742 (2007). While "…Patent Office classification of references and the cross-

references in the official search notes of the class definitions are some evidence of "nonanalogy"

or "analogy" respectively, the court has found "the similarities and differences in structure and

function of the inventions to carry far greater weight." M.P.E.P. §2141.01(a), citing *In re Ellis*,

476 F.2d 13 70, 1372, 177 USPQ 526, 527 (CCPA 1973).

Watermarking operates to place selected *foreign* information *into* a medium, whereas

fingerprinting extracts *native* information *from* the medium. The information in a watermark can

exist independently from the medium which it inhabits; the information that makes up a

fingerprint can not. One of ordinary skill in the art would therefore not logically refer to

processes in Pereira that operate to embed a foreign watermarking code in visual information as

a way of solving the problem of extracting fingerprints (derived from native information) that

tolerate speed changes in audio material.

Thus, Pereira, which operates to embed a watermark in the FFT domain of an image as

part of a watermark detection process, is non-analogous art with respect to the claimed

embodiments that operate to extract fingerprints from audio signals. *See* Pereira, pg. 1, col. 2.

The Applicant therefore respectfully requests withdrawal of the rejection of claims 1-15 under 35

U.S.C. § 103(a) on this basis.

2. Those of Ordinary Skill Would Not be Motivated to Combine Haitsma and Pereira.

As noted in a prior response, those of ordinary skill would not be motivated to combine

Fourier-Mellin transforms with image processing. Certain research results, already presented as

evidence in the record, directly contradict the motivation set forth by the Office for combining

the references (i.e., "… it would have been obvious … to include the magnitude algorithm in

Fourier transform of Haitsma et al in order to overcome the sampling problem and maximizing

the number of points matched between the known template and the image.)"

These include the discovery by Chen that even when the Fourier-Mellin transform is

improved by using FMI-SPOMF (Fourier-Mellin Invariant – Symmetric Phase Only Matched

Filtering), the results are poor in applications that use image data. *See* "Symmetric Phase-Only

Matched Filtering of Fourier-Mellin Transforms for Image Registration and Recognition," Q.

Chen et al., *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 16, no. 12,

pp. 1156-1168, December, 1994.

Thus, even when FMI-SPOMG was applied to matching fingerprint images to improve

the basic Fourier-Mellin process, Chen noted that the results were "inferior to those observed

with the other applications …". *See* Chen, pg. 1165, Col. 2. These "inferior" results, as stated

by Chen, would not lead one of ordinary skill in the art to use the improved version of the

Fourier-Mellin transform in conjunction with processing image data, let alone the regular

version.

In fact, Chen urges even more strongly, with results supported by his own

experimentation, that regular Fourier-Mellin transforms do not provide reliable results with

respect to image processing:

> "… the cross-correlation of the Fourier-Mellin transforms generally yields a very
> broad maximum, and this technique is therefore **unreliable** both for the
> identification and localization of an object in an image. … the usual cross-
> correlation method, which we applied in comparison, **did not yield any correct
> matching** [with respect to visual fingerprint images]." *See* Chen, pg. 1157, col. 1
> and pg. 1165, col. 2. (emphasis added)

Thus, the statement by the Office with respect to combining the image processing

techniques of Pereira as part of a Fourier-Mellin transform process is not supported by evidence

in the record. Therefore, it is improper to combine Pereira with Haitsma.

In addition, since the Office promotes the combination of Haitsma and Pereira against the

teachings of the evidence in the record, the Applicant respectfully requests additional evidence to

support the assertions made by the Office, or an affidavit of personal knowledge by the
Examiner, pursuant to M.P.E.P. § 2144.03, in the next official communication. Otherwise, there
will be no "specific, objective evidence of record for a finding of a suggestion or motivation to
combine reference teachings and … reasoning by which the evidence is deemed to support such
a finding." Therefore, the Applicant respectfully requests withdrawal of the rejection of claims
1-15 under 35 U.S.C. § 103(a) on this basis.

3. Pereira Does Not Teach How to Apply FFT Magnitude Processing to Fourier-Mellin
Transform Components.

     The Office sates that "Haitsma does not explicitly teach converting the transformed set of
features into a sequence constituting the fingerprint." The Office goes on to state that "Pereira et
al. teaches a step includes [sic] converting the magnitudes of the Fourier-Mellin transform (see
section 4.4, magnitude of the FFT, pages 3-5)." However, the Applicant was unable to find
anything within the bounds of Pereira that teaches how one should apply the magnitude
processing of Pereira within a Fourier-Mellin transformation of an audio signal – so that reliable
results would be obtained in the face of speed changes.

     For example, it is respectfully noted that the computation of "the magnitude of the FFT"
cited by the Office and outlined by Pereira is part of an image processing algorithm. In this
algorithm, a square portion of the image is used as input to an FFT magnitude calculation, so that
local peaks in the image can be identified. *See* Pereira, section 4.4. This process has nothing to
do with audio signal amplitude conversion.

     In addition, there is nothing disclosed within the bounds of Pereira that teaches how the
problems raised by Chen might be avoided (e.g., , when a Fourier-Mellin transform is used in
conjunction with image recognition processes). *See* Chen, pg. 1157, Col. 1. Thus, even if the art
did teach how Pereira could be applied to Haitsma, poor results would be expected.

     Therefore, Pereira provides no guidance as to how the FFT magnitude calculation, as part
of the image processing techniques of Pereira, should be applied to a Fourier-Mellin transform of
an audio signal. And even if this teaching were available, the reasonableness of doing so would
be questioned by those of ordinary skill in the art. Thus, the Applicant respectfully requests
withdrawal of the rejection of claims 1-15 under 35 U.S.C. § 103(a) on this basis.

In summary: (1) Pereira constitutes non-analogous art, (2) those of ordinary skill would not be motivated to combine Haitsma and Pereira, and (3) Pereira does not teach how to apply FFT magnitude processing to Fourier-Mellin transform components. As noted in a prior response, the Applicant respectfully submits that the combination of limitations that form independent claims 1 and 8 yield an unpredictable an unexpected result, namely, compensating for speed changes in an audio signal to provide a speed invariant fingerprint. Since the result of the claimed features is not predictable, and because Chen teaches away from the use of the Fourier-Mellin transform in conjunction with image processing techniques, one of ordinary skill in the art would have no reasonable expectation of success when considering the combination of Haitsma and Pereira.

Therefore, independent claims 1 and 8, reciting the transformation of extracted perceptual features from an audio signal to provide a fingerprint that compensates for speed changes in the audio signal, are nonobvious. In addition, any claim depending from a nonobvious independent claim is also nonobvious. *See* M.P.E.P. § 2143.03. Thus, claims 2-7 and 9-15 should also be nonobvious and in condition for allowance, and the Applicant respectfully requests reconsideration and withdrawal of the rejection of claims 1-15 under 35 U.S.C. § 103(a).

AMENDMENT AND RESPONSE UNDER 37 C.F.R § 1.111
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CONCLUSION

It is respectfully submitted that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone the undersigned at (210) 308-5677 to facilitate prosecution of this Application. If necessary, please charge any additional fees or deficiencies, or credit any overpayments to Deposit Account No. 19-0743.

Respectfully submitted,

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being filed using the USPTO's electronic filing system EFS-Web, and is addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 18   day of December, 2009.

 John D. Gustav-Wrathall
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